A New Method for Determining Rate of Progress in a Small School System

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I.

Almost all of the articles appearing within the past few years on retardation and elimination have been based upon a study of large school systems, because, in the first place, city systems furnish uniform conditions of grading; and in the second place, large masses of statistics preclude the erroneous conclusions which would result from insufficient data. In this paper, on the contrary, care has been taken to study the school history of each individual pupil in a small school system, and to ascertain accurately the vital statistics necessary to define the true state of affairs.

The present investigation was undertaken with five purposes in view:

1. To find out the actual conditions existing in a small school system over a number of years;
2. To learn the real extent of retardation, acceleration, and elimination of pupils by following their progress from the day they entered school until the day they finally left it;
3. To draw a valid contrast between the number beginning and the number leaving school;
4. To compare actual with hypothetical results; and,
5. To make such suggestions as may help in ameliorating the conditions which are found to exist.

The facts have been obtained largely from the reports of the white schools of Elkton, Maryland, and through the coöperation of many teachers and students in the schools and of friends outside it was possible to obtain much valuable data which the reports could not furnish. Many of the teachers had taught in the schools for a period as long as that covered by the investigation, and the writer himself, a citizen of the town, was for some time connected with the schools. The facts are considered under two heads: (1) the elementary and high school history of 295 males and females during the years 1891-1892 to 1908-9, inclusive; and (2) the progress of pupils (1514 in all) in the elementary

and high schools for eleven years, from 1898-9 to 1908-9, inclusive.

The town in question is a small county seat. Its population has remained about the same for the past twenty years, and the few industries and the number of employees have not changed materially in that time. The economic conditions are such that practically all the children *could* remain in school until graduation.

The high school was for a number of years the only one in the county, and is still much the largest and best equipped. Until 1902-3 there were six grades in the elementary school, and four in the high school. In that year one grade was added to the elementary course, thus requiring the normal child to remain in school eleven years before graduation. The high school course of study was not affected in any important degree by the change. Two additional facts have an important bearing on this investigation: (1) the age of entrance is six years, and (2) there is no compulsory attendance law in Maryland.

The writer believes he is justified in calling his method "new" for the following reasons: (1) the complete school history of 295 pupils and the school history of 1514 pupils during the time spent in the Elkton system are the basis for obtaining his results; (2) elimination is based on the actual number of beginners; (3) the rate of progress and retardation is based on a system of units of progress; and (4) his measure of the efficiency of a school system is new.

The conclusions arrived at in the following pages will not, of course, apply in all respects to every city school system. They will be indicative, however, of what may be found in communities where conditions are similar to those here prevailing, and a knowledge of the facts of retardation, elimination, etc., is quite as indispensable in the administration of a small as of a large school system.

Retardation.

At the outset of this discussion it seems necessary to define certain terms already in use in the study of school statistics and to introduce some others.

There are three classes of pupils who drop out of school: (1) those who graduate; (2) those who transfer to other schools; and (3) those who leave for other causes. It is to this latter class that the word *elimination* usually refers.

The rate of progress for a school means the average progress of all pupils through the grades; that is to say, the record of the

school system will be a summation upon the records made by the individual pupils in it. The movement of a pupil through his course may be composed of three elements or forces; (1) a normal forward movement, of a unit of work done in one term; (2) a doubly rapid movement of two units of work in one term; and (3) a retarded movement of one unit of work in two or more terms. When a pupil moves faster than the normal rate, *i.e.* does a unit of work in less than the required time, he is said to be accelerated in his movement through the grades. This term is properly the converse of retarded in its customary meaning.

Among those interested in the work of our public schools there is a demand to know not only that a pupil is moving at an abnormal rate of speed, but what the rate of that movement is. Most writers on the subject of retardation have used the term retarded to mean that a pupil is above age for his grade, irrespective of the reason. Thus a pupil twelve years of age and in the second grade, would be considered retarded whether he had attended school two years or six. For others the word signifies that a pupil has failed of promotion one or more times, and is in consequence behind his class for as many years. The first interpretation of the word has no doubt arisen out of the method necessary for the study of large masses of school statistics, and it has been tentatively accepted by most persons with the recognition that the results are only approximately correct and in most cases merely indicate a tendency. Its second use has been advocated by some who believe that the former method does not give exact results; that it is unfair to the school because it considers a pupil retarded who has entered school late, and because it takes no account of a large number of pupils who have advanced faster than one grade per year.

In the present study the second point of view (progress method) has been accepted principally because it shows the actual condition of retardation. At the same time comparisons of results with the aggregate standard will be made to note how far the schools from which the facts have been collected agree in this respect. One would hardly be justified in applying this method to a large school system. The vast amount of time necessary, and the utter impossibility of securing certain facts, would make it impracticable. In the judgment of the writer, it is of great importance in the present state of school records that a method approximating as nearly as possible the real conditions, be devised for measuring the degree of retardation in our schools. Such a

one is herein described. It will show definitely the extent of retardation for which the system is responsible.

Since the word retardation, in the second sense, refers to the progress of a pupil through the grades, it is necessary that a new set of terms be adopted to designate the different degrees of retardation. Three boys may begin school the same year; at the end of the eleventh year one may be in the last year of the high school, one in the second year, and the third in the fourth grade of the elementary school. It is obvious that these pupils have passed through the grades at different rates of speed, and it is important to measure the rate. For this reason the terms units of normal progress, minus progress, and plus progress are here proposed to convey the manner and rate of movement of a pupil through the grades. A unit of normal progress means that a pupil completes a term's work on time; a unit of minus progress, that he completes the term's work in double the required time; and a unit of plus progress, that he completes two terms in the time required for one. For example, a pupil in the fifth grade in the eighth year of his school life may be there because he has made one unit of plus and four units of minus progress, or three units of minus progress, etc. Instead of saying that a pupil is retarded or accelerated so many years, it is possible to express his school status in terms of so many units of plus, normal, or minus progress, thus using a definite terminology for designating the manner by which he has arrived at any point in his school career. The word retardation may still be used as before to denote the condition, but without the duty of serving also as the measure of this condition.

As stated before it was not possible to secure absolutely complete records, yet 295 pupils were found who had passed their whole school life in the Elkton schools and had either dropped out or graduated. It is first attempted to show the exact amount of retardation among these pupils, and subsequently, to study it among 1514 pupils who attended school during some part or all of eleven years. Table I (B) shows the distribution of these pupils from the first year of their school life until the last one dropped out in the fourteenth year. The numbers above the black line give the percentages of those making normal progress, while the numbers below the line indicate the percentages retarded .

Instead of finding an ideal attendance of 100 per cent in the next higher grade each succeeding year, we find the real condition as displayed in the table. Here are 295 different pupils

TABLE I. RETARDATION AND UNITS OF PROGRESS DURING THE COMPLETE SCHOOL HISTORY OF 295 PUPILS

A: Average No. units of normal progress	A: Average No. units of minus progress	A: Average No. units of plus progress	A: Average No. units of all kinds	Year in school	B: Grades — Elementary School 1	2	3	4	5	6	7	High School with 7 Elem. Grades 1	2	3	4	H. S. with 6 Elem. Grades 1	2	3	4	Per cent retarded	Per cent not retarded	Per cent retarded (age-grade method)	Per cent not retarded (age-grade method)	C: Per cent of units of normal progress	Per cent of units of minus progress	Per cent of units of plus progress	Number of pupils
				1	100																100						295
.18	.75	.07	1	2	76	23	1													76	24	7	93	24	75	1	294
.87	1.13	.02	2.02	3	31	48	20	1												79	21	19	81	43	56	1	290
1.58	1.4	.03	3.01	4	11	30	45	13	1											86	14	30	70	52	47	1	287
2.35	1.64	.06	4.05	5	2	13	38	36	10	1										89	11	38	62	58	41	1	281
3.02	1.97	.06	5.05	6	2	5	23	33	28	9										91	9	47	53	60	39	1	270
3.87	2.12	.07	6.06	7	1	1	10	24	31	24	7	1				1				91	9	51	49	64	35	1	242
4.72	2.28	.07	7.07	8		1	5	13	18	31	17	8	1			6	0			91	9	52	48	67	32	1	208
5.54	2.45	.09	8.08	9			4	7	10	17	23	17	6	1		11	4			93	7	51	49	69	30	1	145
6.55	2.45	.1	9.1	10			1	5	3	8	16	24	13	9	1	8	9	3		90	10	53	47	72	27	1	91
7.7	2.3	.04	10.04	11				4	2	2	5	17	23	15	13		9	8	2	87	13	49	51	77	23	1	53
8.58	2.42	0	11	12					4			8	13	29	21			12	13	100		54	46	78	22	0	24
9.09	2.91	0	12	13						9			9		55				27	100		36	64	76	24	0	10
4	7	0	11	14					100											100		100	0	36	64	0	1

A: Units of progress

B: Distribution by per cents

C: Units of progress expressed in per cents

who have started the race of school life together, scattered along the course, further and further apart with the passing of each year. In the eighth year eighteen are beginning another lap together, having kept up the required speed, two have gained a lap, and 178 are falling behind, some one lap, some three, and a few as many as six laps. Again, in the eleventh year, when most of them should have crossed the finishing line together, only six do so without having lost ground. One has lost one lap and regained it, and still another has lost a lap and not regained it, but finishes with the other seven on account of the shorter course. What has become of the other 287 in these eleven years? Two hundred and forty-two have dropped out and the remaining forty-five are found in all the grades from the fourth up to and including the third year of the high school.

Taking as a basis the number of children in school, about one out of ten in the eleventh year of school life has passed through the grades without failure, and considering the number of beginners as a basis the ratio is almost one to fifty. Ayres (1) says: "In our city schools on an average, three out of every four have failed at least once by the time the eighth year of school life is reached, and the whole number of failures is so large as not to fall far short of averaging two for each pupil who has failed." By reference to table I (A), it will be observed that the whole number of pupils in school this year average 2.28 units of minus progress. Of the pupils in school during the eighth year, 45 have failed once; 68, twice; 39, three times; 27, four times; 10, five times, and 3, six times, an average of 2.5 failures for 192 pupils. Hence, the average number of failures is somewhat larger than that found by Ayres.

In the same table are given the percentages of the retarded and non-retarded for each year according to the progress (exact) method and the age-grade method so extensively applied by many investigators, the latter considering as retarded all pupils of the first grade who are nine years or over, all in the second grade, ten years or over, and so on. We are struck with the great disparity in the results obtained from the two methods. In the first few years the age-grade standard shows a low percentage of retardation, with a gradual increase in the later years; for example, only 19 per cent were retarded the third year, 30 per cent the fourth year, 38 per cent in the fifth year, and 47 per cent the sixth year, whereas the actual retardation for these same years based on the number of pupils in school was 79, 86, 89 and 91 per cent,

respectively. The increase in percentages of retardation, according to the age-grade standard, indicates that the degree of retardation is becoming greater with each added year. Only two of the beginners were retarded by this method, and accordingly it is only as they lagged behind that they passed over into the retarded class. To illustrate the failure of this method to catch the retarded, it may be said that while it gives 39 per cent of the pupils of the first grade in the third year as retarded, as a matter of fact every child in that grade has twice failed of promotion.

Seventy-six per cent of the pupils failed in the first grade the first year, which throws light upon the large percentage of retarded pupils in the later years. Of the number of pupils who failed in the first year and who were in school at least eight years, twenty-three progressed normally for the remaining time, eleven of them being present seventy-five per cent of the year or more. If the failures in the first year be excluded from the calculations, 147, or 71 per cent, of the 208 pupils in the eighth year fall into the retarded class. From the point of view of the child there seems to be no good reason for not counting the first year of school life, since the added year becomes a prolific cause of elimination when the child finds himself behind grade in his fourteenth year. From the point of view of the school system there may be reasons for omitting it.

Passing to the study of retardation among 1514 pupils as found in the various grades in eleven years of this same school system, one is confronted with the problem of devising a method to show the per cent of retardation for each grade during any year and the extent to which each pupil is retarded, *i. e.* the number of failures, or units of minus progress made for the time by each pupil.

The important thing to know about the child is not how many years he is behind the theoretical grade for his age, but (1) whether or not he has been retarded in the system in question, and (2) if retarded, how many units of minus progress he has made. With this in mind the present method of determining the first of the factors named above has been adopted, and all pupils that were not present during two years were eliminated from the calculations on the ground that a child must be in the system for this period of time to show retardation at all.

Table II gives the per cents retarded for each grade and each year. In the first line for each year are the per cents retarded by the progress method. The second line contains the per cents

according to the age-grade method. Owing to the fact that in the application of the progress method all pupils who have not been present during two years are omitted from the discussion, there are no per cents for the year 1898-9 for this method.

The per cent of retardation increases rapidly from 1899-1900 when the pupils had been in school only two years to 64 per

TABLE II.

PERCENTAGES RETARDED BY PROGRESS AND AGE-GRADE METHODS. (1514 PUPILS.)

(The upper line for each year gives the per cent for the progress method, the lower line for the age-grade method.)

	Elementary School							High School				E	H	T
Years	1	2	3	4	5	6	7	1	2	3	4			
1898–1899														
	21	35	47	52	56	44		51	26	13	60	34	39	39
1899–1900	*100*	*13*	*23*	*14*	*24*	*0*		*26*	*6*	*16*	*8*	*33*	*14*	*28*
	21	27	42	47	49	44		35	35	41		35	33	34
1900–1901	*100*	*73*	*39*	*31*	*13*	*17*		*41*	*37*	*7*	*7*	*49*	*25*	*47*
	23	30	38	35	40	40		38	33	26	33	32	34	33
1901–1902	*100*	*63*	*78*	*55*	*50*	*29*		*26*	*30*	*27*	*10*	*65*	*22*	*55*
	15	31	38	44	46	32		34	36	21	15	32	17	31
1902–1903	*100*	*60*	*74*	*76*	*46*	*50*	*23*	*90*	*50*	*48*	*30*	*66*	*56*	*64*
	15	20	40	38	34	29	31	41	42	25	20	28	37	30
1903–1904	*100*	*63*	*56*	*65*	*74*	*51*	*40*	*27*	*41*	*45*	*33*	*64*	*37*	*58*
	9	23	23	31	33	38	32	27	38	29	27	25	30	36
1904–1905	*100*	*63*	*66*	*60*	*60*	*70*	*56*	*37*	*18*	*33*	*43*	*66*	*33*	*59*
	7	20	38	27	27	25	35	21	21	36	27	24	26	25
1905–1906	*100*	*61*	*71*	*71*	*65*	*55*	*63*	*35*	*20*	*18*	*26*	*66*	*25*	*56*
	13	10	32	35	27	27	23	25	14	11	30	23	21	23
1906–1907	*100*	*63*	*60*	*85*	*64*	*62*	*45*	*53*	*27*	*9*	*13*	*68*	*29*	*56*
	17	24	24	38	26	23	27	14	22	5	13	25	14	23
1907–1908	*100*	*70*	*63*	*70*	*73*	*55*	*64*	*50*	*22*	*21*	*11*	*71*	*26*	*62*
	14	25	18	37	28	17	17	16	6	10	11	22	11	20
1908–1909	*100*	*62*	*67*	*73*	*61*	*68*	*50*	*61*	*41*	*27*	*28*	*69*	*43*	*63*
	11	16	33	31	38	29	17	17	27	24	11	23	20	23

cent in 1902-03. From that point there is a decline for two or three years, with a rise to 63 per cent in 1908-09. The greatest amount of retardation, as one would expect, is in the earlier grades. Here most of the failures occur, and here is found the greatest congestion, which is relieved only by the dropping out process that takes place at the ages of twelve, thirteen and

fourteen. The first grade shows one hundred per cent retarded in each year, due to the fact that the only pupils considered in our calculations must have been in school more than one year. The next largest percentages of retardation are in the second, third, fourth, and fifth grades. A glance at the columns headed "E" (elementary school), "H" (high school), will give sufficient evidence that a larger per cent of the pupils in the elementary school is retarded than in the high school. This proves that the pupils making the most failures drop out in the lower grades.

After the year 1899-1900 there is an almost continuously increasing difference between the percentages calculated by this method and those by the age-grade method. This difference reaches its maximum in the last two years, where the per cent of retarded according to the progress method is approximately three times that of the other method. It is probably more nearly correct to say that if the same pupils were involved in the two methods, the former would show more than twice as many retarded as the latter. The reason for this conclusion is that all beginners are excluded in the first and included in the last method. Moreover, out of the 1051 pupils in the schools more than one year, 587, or 56 per cent failed at least once, *i. e.* the system's retardation is 56 per cent. According to the age-grade standard it is 28 per cent for the 1514 pupils. Superintendent Lurton shows (2) that the percentages of retardation based on the Minnesota standard (pupils under seven in the first grade, under eight in the second grade, and so on for the other grades, being classed as non-retarded) are approximately double those based on the age-grade standard. That the latter method gives results greatly in favor of the system, there seems to be no reasonable doubt, its chief value consisting in the fact that it discloses a tendency toward retardation and offers a facile method of comparing the percentages of retardation from year to year, and its chief defect being that it fails to show the correct extent of that retardation.

According to Ayres' (3) list of 33 cities, Elkton by his standard of measurement would range from twenty-fourth place in 1898-99 to eighth place in 1908-09. There is little doubt that the retarding forces were stronger eleven years ago in this town than they are to-day, but they are still too potent in the early grades for the welfare of the child.

The second fact to be ascertained concerning these pupils during eleven years is the degree of retardation, *i. e.* the relative number of units of minus progress made by them. Collectively

they made 3938 units in all, of which 26 were units of plus progress, 937 units of minus progress, and 2975 units of normal progress, an average for each pupil of 3.74, .02, .89, and 2.83, respectively, or 1, 24 and 75 per cent, respectively, for each of the three kinds of units. Three hundred and fifty pupils in school in 1908-9 averaged 1, 23, and 76 per cent, and the 295 pupils 1, 32, and 67 per cent, respectively, for the three kinds of units. The percentages of normal progress made by the first two groups is about the same, but that made by the third group is somewhat smaller. The difference is to be accounted for largely by the fact that the complete school history of the first two groups is not known, and especially that part of school life when the retarding force is strongest,—in the early grades. If we keep in mind the fact that 326 of the 1051 pupils entered the system from outside schools and that 195 of this last number entered the high school directly, we can understand the cause for the disparity in percentages of the first and third groups, and between the second and third groups. Table I (A) furnishes the same data for the 295 pupils of each year.

A casual comparison of progress with retardation might lead one to believe that the percentages contradict one another. The fact is they do not; the former corroborate the latter. What an average of 27 per cent of units of minus progress means is, that according to the progress method of determining retardation, about 90 per cent of the pupils who have been in school for eight or ten years will be retarded. This same per cent of units of minus progress in the fifth year of school life would imply a much smaller per cent of retardation.

Causes of Retardation.

The one cause of retardation from the point of view of this investigation is failure of promotion, and the causes that produce these failures are directly responsible for the condition of retardation in schools. It has already been pointed out that a retarded pupil is one who for any reason has failed one or more times to make the next higher grade. The pupil himself may be responsible for it, the parents may be blamed for it, or the school system itself may be at fault. It is clearly evident each year that the school is having thrust upon it greater responsibility for the social, moral, and mental welfare of the child. This does not mean that the responsibility of the home is being in any degree lessened, but that the state is assuming certain functions that neither of these

agencies has exercised in the past, or if they exercised them, did so only in a spasmodic way.

By referring to table III it will be seen that the major portion of the failures is in the early grades, 78 per cent of one group and 90 per cent of the other being in the first four grades. Comparatively few failures are made in the high school. The largest per cents of failures are in the first and third grades. Consequently, we may expect to find the greatest congestion in these two grades, and such is the case in every one of the eleven years of school except two. Not only is it true for the town, but it is also true for the county, for seven out of eleven years, and in the state

TABLE III.—FAILURES MADE BY 1051 AND 295 PUPILS.

	Elementary School							H. S. with 7 Elem. grades				H. S. with 6 Elem. grades							
Grade	1	2	3	4	5	6	7	1	2	3	4	1	2	3	4	E	7H	6H	T
Failures by 1051 pupils.....	401	76	134	120	73	27	17	7	1	1		48	24	7	1	848	9	80	937
Per cent per grade....	43	8	14	13	8	3	2	1				5	2	1		91	1	8	100
Failures by 295 pupils	359	78	119	78	30	10	6	5	1	1		10	4			680	7	14	701
Per cent per grade....	51	11	17	11	4	2	1	1				1	1			97	1	2	100

outside of Baltimore City for eight out of ten years. (7) Hence it is in these lower grades that the retarding forces are most potent.

Contributory to the principal cause of retardation are the following: irregular attendance, late entrance, leaving before final examinations, lack of capacity for work, indifference on the part of the pupil, poor teaching, physical defects, too much work and many minor causes closely related with those named.

No doubt the most important of these secondary causes is irregular attendance. Under this may be included late entrance and leaving before examinations. There is naturally supposed to be a definite relation between the content of the course of study and the time a pupil should spend in school. We provide in some districts ten months, in others nine, and in still others eight months, more or less, of school. Yet there is great uniformity in the quantity of the subjects the pupils are expected to assimilate in these different periods of time.

Of the 295 pupils, 38 per cent of the non-promoted and 77

of the promoted attended three-fourths time or over. Of the 1051 pupils the percentages for the same period are 42 and 84. That is, about 80 out of every hundred of the promoted and 40 out of the same number of non-promoted attend three-fourths time. Again, out of every hundred pupils of those whose complete school history is known, making three-fourths time or better, 82 are promoted and 18 are not. And for every hundred of the 1051 making three-fourths time or more, these numbers are 86 and 14. If the first and second grades are omitted in making the calculations, the number of failures made by every hundred pupils will range from 11 to 14, and the number of promotions from 86 to 89. Of the number making between one-half and three-fourths time the number of promoted and the number of non-promoted out of every hundred are 57 and 43, respectively. For those present less than one-half time, from 70 to 79 fail while from 21 to 30 succeed in getting into the next higher grade. Thus it will be seen a high per cent of attendance is a necessary qualification for promotion.

In this study, "entering late" means that the pupil did not enroll the first month of the term; "leaving early," that the pupil left before examination time at the end of the scholastic year. Of the total promoted, 10 per cent, and of the total non-promoted, 46 per cent, entered late, left early, or both entered late and left early. That is, about 10 out of every hundred promoted make the next grade in spite of the conditions, and 46 out of every hundred of the non-promoted may lay the blame in part to these conditions. Out of every hundred enrolments, 7 of those entering late or leaving early were promoted and 15 not promoted. Of these 15, 3 failed on account of late entrance, 7 on account of leaving early, and 5 on account of both of these conditions. Thus, for these two causes, twice as many failed as passed. In producing non-promotions, leaving early seems to be more than one and one-half times as potent as entering late. This is in accord with what we might expect to find. Many pupils enter school a month late, and in the earlier grades readily make up the work and are passed into the next class. But the pupils who leave before the final examinations at the end of the year have no chance of promotion unless they are given special examinations at the beginning of the next term, or are promoted on trial.

That too much or too difficult work is an important factor in producing retardation admits of no doubt. Two pieces of evidence are offered in support of this fact. First, the per cent of failures in the third grade is almost twice as large as for the second grade.

In the third grade the addition to the content of the course of study is much greater in comparison with that made to the second or fourth grades. Secondly, the per cent of failures made by pupils of the 1514 group in the early high school is about eight times as many as that for the later high school. The course of study was then less flexible than in later years, and in consequence students had a much greater content to master. It is also a fact that a larger per cent of pupils of the high school with six preliminary grades than of the one with seven preliminary grades made three-fourths time and failed. Since a larger per cent of pupils in the first than in the second high school failed of promotion it must be attributed to either too much work, or more stringent methods of promotion.

Lack of capacity and lack of application as factors in producing retardation are well illustrated among those pupils who make 90 per cent of attendance and yet fail of promotion. Just how these failures should be distributed between the two factors is difficult to say. Seventeen per cent of the total number of failures made by the 295 pupils and 19 per cent of those made by the 1051 pupils occurred in spite of the fact that these pupils attended between 90 and 100 per cent of the school year. This means that probably 20 out of every hundred failures are to be charged to either lack of capacity or to indifference.

In order to ascertain whether or not transferring from one school system to another occasions retardation, the average age of 422 pupils entering the first year of the high school from outside schools was compared with that of the pupils entering the same class from the town system. The average age of the former was 14 and of the latter 14.1 years. There is no evidence here that there is a loss in the transfer. However, there seems to be little doubt that there is a loss of considerable proportions in many systems. The equality of these average ages may be accounted for by the greater retardation in the system in question than in that from which the pupils come, but there is no evidence to support this.

Poor teaching as a cause of failures in school work is one that is difficult to estimate in its effect. Irregular attendance is in many cases chargeable to the uninteresting manner in which teachers conduct their class-room work, and whatever produces absence from school is sufficient cause for failure in school promotion.

Besides the forces discussed above as causes of retardation,

physical defects in school children, over-crowding, lack of a compulsory attendance law, or the non-enforcement of the same, and many others are contributory to slow movement through the grades. However, there is no statistical evidence bearing upon the gravity of each of these.

Summary on Causes of Retardation.

Failure of promotion is the prime cause of retardation.

Failure of promotion is produced by irregular attendance, late entrance, early leaving, poor teaching, too much school work, lack of capacity, indifference, physical defects, etc.

Most of the failures take place in the early grades, between 70 and 90 per cent before the sixth grade.

Out of every hundred making three-fourths time from 14 to 18 fail and from 82 to 86 are promoted.

A relatively larger number of non-promoted pupils in the high school than in the elementary school make three-fourths time or more.

Leaving early is one and one-half times as potent as late entrance in producing non-promotions.

While poor teaching and lack of capacity and too much school work are very important factors in bringing about the condition of retardation, their relative effects are hard to estimate.

II.

Acceleration.

In all the discussion on the subject of retardation scarcely any consideration has been given to the neutralizing force of acceleration or double promotions. There may be much of it in larger school units as stated by Thorndike (4), Greenwood (5) and Wagner (6), but in the smaller ones its effect in offsetting failures is insignificant.

In the Elkton schools, of the total number of units (2221) made by 295 pupils, 19 were units of plus progress; and of 3938 units of all kinds made by 1051 pupils, 26 were units of plus progress. In either case they represent less than 1 per cent of the whole number of units. Special inquiry, moreover, reveals the fact that more than one-half of these double promotions were the result of work done in the summer under private tutors. Double promotions made under such conditions are merely evidence of ambition and ability on the part of the pupils making them, as testified by the fact that approximately 80 per cent of such pupils reached the high school. That there is not in many schools more promotion during the year on account of special fitness, is largely due to the fact that there is no person who will assume the authority to put pupils up on trial. There is too little of this sort of necessary supervision in our schools, especially in the grades where it is most needed.

Rate of Progress through the Grades.

By the rate of progress is meant the rate at which the average pupil passes through the grades. It is evident that for the individual this rate varies, being dependent upon the ratio of failures to promotions.

If a pupil completed five grades of work in five years, or eight grades in eight years, *i.e.* a grade for each year in school, we would classify him as normal; if he did the same amount of work in less than that time, as supernormal; and if in more than

that time, as subnormal. Of the 295 pupils under consideration, according to this classification, 2 would be supernormal, 23 normal, and 270 subnormal. It will be seen that a very small per cent of pupils pass through the grades at a normal rate of speed. Perhaps it would be well to classify all who reach the high school with only one failure as normal, for it is doubtless true that the majority of such pupils have failed once. From this point of view, the requirements of the course of study might even be considered supernormal.

Table 1A* gives the average of each kind of units and the average total for each year. For example, the pupils in the eighth year of school have completed 4.79 grades, whereas they should have completed seven grades. In the eleventh year those still in school have completed 7.74 grades instead of ten. At the same rate it would require the pupils in the eighth year approximately 14.6 years to complete ten grades, and those in the eleventh year 13 years to complete the same number of grades. It is clear that the greatly retarded ones in the eighth year have dropped out before the eleventh year, as is evidenced by the differences in time necessary to complete the ten grades.

Taken altogether the 295 pupils made 1513 units of normal and plus progress in 2202 units of time, or an average of 1.45 years for a grade. At this rate it would require the average pupil 14.5 years to finish ten grades. Pupils moving at this rate through the grades do not graduate. Those in school in 1908-09 have completed 1254 units of normal and plus progress in 1627 units (years) of time, which is equivalent to an average of 10 grades in 13 years. This is probably too low a rate of progress for the system over a period of time, 14.5 years being more nearly correct. Due weight is given to the fact that the pupils in school in 1908-09 have not been in this system from the time they first began school. Consequently, many of the units of minus progress made in the early grades are not included in calculating the rate of progress for those pupils.

Ayres shows (8) that "the average child in the average city school system progresses through the grades at the rate of eight grades in ten years." On the same average such a child would complete ten grades in approximately 12.5 years, or two years less than the average child in the Elkton system. There can be no question that the rate of progress will vary with the system. According to the Ayres method it would require 11.2 years for

* See THE PSYCHOLOGICAL CLINIC for January 15, 1912, p. 255.

Aurora, Ill., and for Erie, Pa., 16.6 years, for the completion of ten grades.

Leaving School.

Pupils leaving school come under three heads,—graduates, those leaving to enter another school, and those dropping out finally before graduation from the schools.

The graduates of a system represent its finished product; and the larger the number of these, other things being equal, the more efficient is the system. That this finished product is very small in proportion to the raw material is generally known. Out of our 295 beginners, only 8.5 per cent graduated, that is, approximately 17 out of every 200 finished the course.

In order to estimate roughly the per cent of graduates for eleven years, a number equal to one-eleventh of the whole number of beginners has been taken as a basis. The reason for this is that the number of beginners is about equal to one-half the number of enrolments in the first grade for the eleven years. The number of beginners is 555, one-eleventh of which is 50.5. The number of graduates during this time is 172, an average of 15.6 per year, or 31 per cent completing the course. If the rate of progress is as we have shown it to be, it is evident that this per cent is too high. The explanation is to be found in the fact that 44 per cent of the students in the high school have entered it directly from other schools, and that a fair percentage of these remain to graduate. It is probably more nearly correct to say that the percentage of graduates from the high school under normal conditions is about eight.

Of the 1514 pupils in school during eleven years, 360 left

TABLE IV.—NUMBER AND PER CENT ELIMINATED BY THE END OF EACH GRADE.
(Graduates not included.)

		Elementary School							High School			
	Grades	1	2	3	4	5	6	7	1	2	3	4
Group 295	Pupils.....	8	12	42	86	122	167	196	241	261	269	270
	Per cents...	3	4	14	29	41	56	66	81	88	91	*a*92
Group 1514	Pupils (1-11 of number for 11 yrs.).	1.55	.55	5.2	6.6	6.4	6.7	4.5	12.3	6.7	4.5	1.36
	Per cents...	3	4	14	27	40	53	62	86	100	109	112

(*a*) 8.5 % graduated.

TABLE V.—PER CENT ELIMINATED BY THE END OF EACH YEAR OF AGE.
(Graduates not included.)

Ages	8	9	10	11	12	13	14	15	16	17	18	19	20
295 Group...	1	2	5	10	16	37	61	77	87	90	91	*a*92	
1514 Group *b*	1	1	5	10	19	35	55	80	97	108	110	112	112

(*a*) 8.5 % graduated.
(*b*) Calculated as in Table IV.

to enter other schools. Thirteen per cent of the 360 transferred from the high school and 87 per cent from the elementary school. On the other hand, 44 per cent of the students coming from other schools enroll in the high school. The great disparity in percentages of pupils leaving and entering the high school, is to be accounted for by the fact that most of the pupils leaving the high school are compelled to give up their public school education altogether.

The discussion of the vast number of pupils who actually quit the grades and leave unfinished the education which the state provides, will centre around two questions: (1) In what grades and at what ages do the pupils leave school? (2) What are the causes for this dropping out?

The percentages in table IV answer the first of these questions. It will be seen that with both groups of pupils, 295 and 1514, the eliminating process begins early in the grades, being heaviest in the fourth, fifth and sixth grades, and in the first year of the high school. In the last grade mentioned there is an elimination of 24 per cent in the large group. The same peculiarity is manifested in table V, which gives the elimination by ages, where 25 per cent drop out at fifteen, and 17 per cent at sixteen. This large amount of elimination in the first year of the high school and at the ages of fifteen and sixteen is due to the large number (44 per cent) of pupils entering the high school from the outside. Up to the last grammar grade the percentages of elimination for the two groups are approximately the same for the different ages and grades.

Ayres (9) and Thorndike (10) express contradictory opinions on a fundamental fact concerning elimination in the early grades. The former contends that "there is abundant evidence that the general tendency of our schools is to hold practically all of the pupils to the sixth grade," while the latter believes that "pupils leave in considerable numbers from almost the beginning of the elementary school course." No doubt there are sys-

tems which will furnish evidence for each opinion. In the Elkton schools the figures corroborate the fact that many pupils leave in the early grades, and it is probably true that this is the general tendency throughout the schools of Maryland, outside of Baltimore. In the former there is no compulsory attendance law to hold them to a specified age. Consequently, many leave who would continue longer in the grades of systems where such a law is enforced. If the failures are very heavy in the first six grades, elimination may be concealed by the seeming equality of these grades; but the natural inference that there is little or no dropping out there would be unjustified. Thorndike shows an elimination of 60 per cent by the last grammar grade, Ayres 49 per cent, while in Elkton approximately 66 per cent have dropped out before the high school is reached. The larger percentages of elimination in the earlier grades in these schools, as compared with other studies, may be partly chargeable to the absence of a compulsory attendance law and partly to the large number of failures in these grades.

In calculating the number of pupils retained to the several grades both Ayres and Thorndike have used as a basis a number of beginners variously estimated. Applied to the Elkton statistics the Ayres' method gives a number of beginners too small by 10 per cent, while the number obtained by the first of Thorndike's methods is too large by 42 per cent, and by his second, by about 8 per cent. The latter investigator does not state which method would be applicable to small systems. If the first of the two were used the inferences based on the results would have little or no value. Ayres' method of calculating the beginners gives a number not far from the true one in systems where the migratory movement of the population is not large. If, however, unusual conditions of change prevail in a school population, it will be difficult to determine the true retention and elimination in the grades except by having exact data as the basis for such calculation.

Summary on Leaving School.

Approximately eight out of every hundred beginners remain to graduate.

Eighty-seven out of every hundred transfers are from the elementary schools.

About three and one-half times as many pupils enter the Elkton high school from the outside as leave it to go elsewhere.

Elimination forces are operative in all the elementary grades, being strongest in the fourth, fifth and sixth grades.

Approximately 66 per cent of the pupils have left school before the first high school year is reached.

Causes of Elimination.

This brings us to the second question, What are the causes for this dropping out process?

Retardation is both an effect and a cause. Irregular attendance, incapacity, late entrance, etc., produce it, and in turn it is the most potent cause of elimination. Whenever the work of the grade must be repeated, indifference is often engendered, a dislike for work follows, and the pupil leaves. It is, indeed, rare that a pupil will remain to complete the high school course who has failed more than twice. If we assume that he enters at the age of six and fails twice, he will be almost twenty years of age when he graduates. Boys, in particular, have no inclination to remain in the secondary school until twenty-one. By applying the age-grade method to the 622 pupils leaving finally in eleven years, it is found that 60 per cent are retarded as compared with 31 per cent for the whole number in school for the same time. Again, of these same pupils the average number of units of minus progress for those leaving is 1.14 and for the whole number in school .89. Here is evidence, then, that retardation brought about through failure to make promotion, is an important cause of leaving school.

A second important cause of elimination is age. Of the 270 pupils leaving school the largest proportion, 21 per cent, drop out in the eighth year. This brings the child to the age of fourteen or fifteen, the age at which the largest per cent of pupils leave school. Pupils will remain in school during their early years, despite failures to accomplish the work, but when they reach their thirteenth, fourteenth or fifteenth year and find themselves in the lower grade, they see the hopelessness of their attempt to finish the course, and if most of their companions have left school, or are in the higher grades, they leave to take up some occupation in which they can *do something*. In schools where an effective compulsory attendance law precludes leaving school until fourteen, large numbers drop out of the elementary school at this age. Retention to this age, however, has an effect of tiding over the critical period for many boy and girls, with the result that they remain to complete the course. This fine influence is lost to the schools where the statute books contain no such act.

There are many other conditions which indirectly are the cause of pupils leaving school. Many of these, such as ill health, needed at home, sickness of others, etc., are merely the last straw. Forces have long been at work impelling to this final day in school. So long as the centripetal forces towards the school are stronger in the aggregate than the centrifugal forces away from it, the child remains. But once the balance begins to swing tne other way, it moves rapidly and is hard to check in its course. That this ultimate elimination in nine out of ten cases is not the result of any one impelling cause, admits of no doubt. An accumulation of gathering forces, as the pupil wends his way along the school course, is the real cause of leaving. The home and school and society in general are all more or less responsible for the final outcome, leaving school.

Measuring the Efficiency of a School System.

Many methods have been adopted for comparing the relative merits of different school systems; oftentimes a method is advocated merely because of the favorable showing it makes for the system interested. As soon as it fails to do this it falls into disuse. Frequently a system boasts of the large number of members in its graduating class, or the number of the first year of the high school who reach the last year, or the per cent the number in the last year of the high school is of the whole number in the school. All these provide means of comparing some feature of one system with the same feature of another, but they do not accurately determine what the real efficiency of the system is.

Ayres (11) has proposed a method for estimating the efficiency of a system which seems at first glance to offer a fair basis for comparison. Two factors are considered: first, the per cent of output on the basis of one thousand beginners, which gives efficiency from the point of view of product; and secondly, the per cent the ideal number of pupils is of the actual number necessary to produce the output, which gives the efficiency from the point of view of plant economy. The first of these multiplied by the second expresses the index of efficiency of the system. That is, if a school has in its eighth grade, or last year of the elementary school, for every one thousand beginners, four hundred pupils, the first factor of efficiency would be represented by 40 per cent. If instead of eight thousand pupils in the eight grades, there are nine thousand, then the efficiency from the second point of view would be 88.8 per cent. The product of

these two gives 35.5 per cent as the index of efficiency for the school.

Granting then that Mr. Ayres' methods of obtaining the number of beginners and the number reaching the last grade of the elementary school would give approximately the correct results for a school system where no pupils entered from the outside and none left to enter other schools, a just comparison of the efficiency of different systems could be made.

But do all the children who begin in a school system remain in it until they leave finally? Is the number that enters the schools of any community, borough, or township, from other schools of any considerable magnitude? The answer to the first question must be in the negative; not only do they not remain in the system, but a very large percentage of them leave to enter other schools. Of the 1514 different pupils who were in the Elkton schools during eleven years, 360, or 24 per cent, left to enter other schools; 46, or 3 per cent of these were high school pupils, and 314, or 21 per cent, were from the elementary grades. It must be borne in mind here that of these 1514 pupils 360 of them were still in school in September of 1909, so that the basis on which these percentages are estimated is too large. If they were calculated on a basis of 1514 minus 360, or 1154, the results would be 4 and 27 per cent respectively. Here, then, it is evident that many pupils leave one system to enter another, and that most of the transferring is among the elementary grades.

Now for the second question: Is the number that enters from other schools of any considerable magnitude? Out of the 1514 pupils just referred to, 591 or 39 per cent, came from outside schools. Of this last number 330, or 22 per cent, entered the elementary grades, and 261, or 17 per cent, entered the high school.

This estimate does not allow for the fact that 367 of the 522 pupils in the school in 1898-99 were there before that year. If this number be deducted from the 1514, and the difference, 1147 be taken as a basis, the pupils entering from other schools will be 29 and 23 per cent respectively.

If the conditions shown to be true in the Elkton schools prevail in other systems, and there is every reason to believe they do, for this is a community in which the population makes no more than the average change from year to year, then the question arises: What system does Ayres' index of efficiency measure? If 39 per cent of the pupils in the school are from other systems,

his method gives a value which is made up of the elements good and bad of numerous systems. From what systems these pupils came, and how many from each, are questions that a lack of data prevents our answering. It is probable that many of the pupils who enter a highly organized system, suffer more in the system from which they come than they would during the same period in the one they enter. This being the case, does the index of efficiency determined by the method described justly estimate a system's worth? It seems evident that such a procedure would place responsibility on the wrong shoulders.

Some plan is necessary that will show what the system has done and is doing for the pupils for the length of time they have been under its influence. What would be better than all else from the point of view of the public school system in general, would be to have a complete record of each individual pupil in order that the effect of the whole educational process on the child might be known. This, in our present condition of school records, is beyond our power to measure, but something can be done in the way of determining the effect of the different factors of a system on the pupils within it.

It has been shown in previous sections on retardation and leaving school, that failure of promotion produces retardation, and that elimination is due to a high degree of retardation, or frequent failures, or in other words, that the larger the number of units of minus progress as compared with that of normal and plus progress combined, the older the pupils become in the lower grades, and the greater will be the per cent of elimination in these grades.

Moreover, the more pupils drop out in the lower grades the fewer there will be in the first and subsequent years of the high school. Since there is this definite relation between the numbers of these different kinds of units of progress, the efficiency of a system may well be measured by a per cent obtained by dividing the combined number of units of normal and plus progress by the sum of the units of normal and minus progress. For example, the 1514 different pupils who were in the Elkton schools during the eleven years made 3001 units of normal and plus progress and 3912 units of normal and minus progress. The former divided by the latter gives 77 as the index of efficiency for the system during eleven years. While this illustrates well enough the method of obtaining the per cent, it would be impracticable to apply it to so long a period of time. What every

superintendent of schools should be able to do in any given year, is to report upon what his system has done for the pupils who have been under its influence.

A study of the records of those pupils who are in school at the beginning of 1908-9 and who have been in the present system during previous years reveals the fact that the total number of units of normal and plus progress is 1254 as compared with 1627 units of normal and minus progress. This gives as the index of efficiency 77, or practically the same as that for the eleven years.

Still another way of showing the efficiency of a system is to find the relation between the same factors named above for all the pupils in the school for the year. This might be termed the *yearly efficiency* of the school system, as distinguished from the *period efficiency* which represents the relation of the total number of units of normal and plus progress to the number of units of normal and minus progress for the period of years chosen. As an example of the application of this method to determine yearly efficiency, the total number of units of normal and plus progress combined and of normal and minus progress are for the year 1908-9, 333 and 436, respectively. By dividing the former number by the latter the index of efficiency is found to be 76.4.

Of the three ways of applying this method, the last is the most practicable, for it is the most economical from the point of view of time and labor. Moreover, it offers a facile means, not only of comparing one system with another, but also of comparing the efficiency of the same system from year to year.

Summary.

In the present state of school records the efficiency of a school system cannot be measured by a ratio between the number of beginners and the number of pupils reaching the last grade of the elementary or high school, because of the large percentage of pupils entering the system from the outside, and leaving to enter schools elsewhere.

The ratio of the number of units of normal and plus progress to the number of units of normal and minus progress will give an adequate method for measuring efficiency.

Either yearly or period efficiency of the system may be measured.

The efficiency of the Elkton school system is approximately .77.

Suggestions to Superintendents.

In the gathering and study of the statistics in this investigation a few facts have stood out so impressively that it seems worth while to present them for the benefit of those engaged in the organization of schools.

First, the necessity of some other method of promotion than that used in many of our large school systems to-day seems imperative. It is still the custom in practically all the smaller towns and in a large number of cities to make promotions only at the end of the year. That this is a serious factor in producing retardation there can be no doubt.

If late entrance or early leaving is not due to actual absence from school, but merely to a transfer from one school to another, it is not so likely to result in failure of promotion. But if children are out of school on account of sickness or because of being needed at home in the fall or spring, they will fail to make the next higher grade at the end of the year. Of the 701 failures made by 295 pupils, 134 were made by pupils who entered late or left early. Of these 134 failures, 37 were related to late entrance, and 97 to leaving early. Investigation reveals the fact that 111 of the 134 enrolments entering late or leaving early were present either for the first half or for the last half of the year. Previously, it has been shown that 85 per cent of those making 90 per cent of attendance are promoted. Therefore, if we take 85 per cent of 111 we have 94 pupils who would have been promoted if the year's work had been divided into two separate units, one to be completed during the first half and the other during the last half of the school year. In all there were made by these 295 pupils 701 units of minus progress. Promotions made as described above would have decreased this number 94, or 13 per cent. The system that has double promotions does more than make a saving of 13 per cent of the number of units of minus progress among those pupils that make 90 per cent of attendance for a half a year. There are some pupils who make as low as 80, 70, and 60 per cent of attendance and yet are promoted. A part of these too would be rescued from the school failures by the system of double promotions.

In this connection it may be suggested that a special class should be formed in every school to give additional instruction to pupils behind their grades. Many failures would never be made if each school system provided such a means of assisting the pupils at the time when they most need it. Many a child has received

the first start toward elimination when upon returning to school after an unavoidable detention at home he has been held responsible for previous work without any assistance from the teachers or others. The special class or special teacher would have removed this cause for future failures and consequent early leaving of school.

A second matter which needs attention is examinations. In some few schools examinations have been done away with because of the feeling that they are unnecessary. To the writer they seem to have one significant implication; that the average teacher is incapable for one reason or other of judging whether or not a child is fitted to pass to the next higher grade.

In order to throw some light upon this question a special study has been made of 1514 pupils. It appears that 509 including the first and second grades (239 without them), did not attend up until the time of final examinations and yet were found in school the next year, either in the grade of the previous year or in a higher one; 171 of these including the first and second grades (80 without them), were promoted. That is, omitting pupils of the first and second grades, 17 per cent of those not attending up until the time of examinations were promoted to the next higher grades. It may be assumed that a few of these did take the examinations at the beginning of the following year, but this was not a usual custom. Since no system of exemptions is in vogue in the Elkton schools, here is evidence that many pupils are promoted either on trial, or in some manner make their way into the next higher grade without having to take the examinations that are considered all important.

The third and perhaps most important fact that has been brought out in this study is the utter lack of data necessary for a proper study of school problems. A need for a uniform record card has long been recognized by those connected with educational matters, and many such cards have been proposed. In this investigation the writer has personally gathered and collated the statistics which are here set forth in tabular form, and he has had abundant opportunity to learn what a record card should contain. During this whole study note has been made of what facts should be recorded on such a card, and it is believed that the cards here proposed give all the practical information necessary to determine at any time exactly what a system is doing for the pupils in it, and what it has done for them in the past, so that the index of efficiency may be accurately determined, and valid comparisons made with the results of other systems.

The transfer card suggested here seems to indicate all the information that one system should send to and immediately receive from another. The numbers on this card should provide a means of obtaining any additional facts that might be necessary to a complete history of the child's school life.

(Front)

Record card of.....School.....
(Address)

Pupil's name.....Pupil's number (in this system).....
(Last name) (First name)

Preceding schools with pupil's numbers (in order from first).....

Dates:.....Beginning school.....Leaving school.....
(yr. mo. da.) (yr. mo.) (yr. mo.)

Grade admitted to school year
Possible attendance (in days)
Actual attendance (in days)
Age (year, month)
Examined or not end of year
Exempt or not from exams. (grade)
Promoted or not (grade)
Promoted on trial
Date of entering (for year)
Date of leaving (for year)

Causes of absence
Sickness of self
Sickness of others
Bad weather
Changing schools
Needed at home

Causes of non-prom.
Absent from examinations
Failed to make required average
Lack of ability
Entered too late
Irregular attendance

(Back)

Physical record

Contagious diseases
Vaccinated or not
Nervous system
Lungs
Nutrition
Throat, mouth, nose
Hearing L R
Sight L R

Mental record

School year
Grade
Application
Deportment
Punctuality
Arithmetic
Reading
History
Language
Geography
Spelling
Drawing
Writing

The cards proposed here are the result of educational experience covering many years of school work.* If they prove to be of use in bettering the manner of keeping our school records, the writer will feel repaid for the amount of time and thought he has given to the task.

Transfer card of...School...
(Address)

Pupil's number in system just left..................Name...
(Last name) (First name)

Preceding schools with pupil's numbers (in order from first)..

Dates: Birth..............................Beginning school......................Leaving school...............
(yr. mo. da.) (yr. mo.) (yr. mo.)

Grade					Present standing											Physical history of abnormalities									
Last year	This year	Next year	Skipped	Repeated	Application	Deportment	Punctuality	Arithmetic	Reading	History	Language	Geography	Spelling	Drawing	Writing	Sight R	Sight L	Hearing R	Hearing L	Throat, mouth, nose	Nutrition	Lungs	Nervous system	Vaccinated or not	Contagious diseases

Fill out, detach, and send to...School...
(Address)

Pupil's number (in system just left).....................Name...
(Last name) (First name)

Pupil's new number in system just entering......................

Grade entered.........................When...........................
(yr. mo. da.)

....Principal.

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